

Abstract

A wind turbine with a permanent magnet alternator that uses a boost mode controller to improve performance at low and high wind speeds. The boost mode controller also allows the permanent magnet alternator to be slowed so that the wind turbine can be stall controlled. A rectifier bridge circuit includes a power electronic switching device on each phase to selectively short the voltage on that phase. The duty cycle of the switching devices is controlled to give the desired wind turbine performance. The switching frequency of the power electronic switches is continuously modulated at low wind speeds in order to minimize tonal acoustic emissions.

The controller simplifies the design of the wind turbine by accomplishing the necessary control functions without adding additional complexity to the wind turbine. This improves the cost-effectiveness of the wind turbine. The improvement in cost-effectiveness allows the wind turbine to be economically utilized at a location with a lower wind speed than previous wind turbine designs allowed.